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THE MYXOMYCETES of WISCONSIN

By

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INTRODUCTORY

The Mycetozoa number at present about four hundred species, the greater part of which are contained in the group of the Myxomycetes or Slime-Fungi (the Myxogasteres of Fries) and the smaller part in the group distinguished by Van Tieghem under the name of Acrasieae.

The Mycetozoa, according to Strasburger, are an independent phylum. The Acrasieae are supposed to be connecting links between the Myxomycetes and Rhizopods, but no line of development has yet been found between these and any higher plant forms.

Their mode of life is similar to that of the fungi. They have no chlorophyll. A few, like Plasmodiophera brassica, are parasites, but the greater number are saprophytes. The Myxomycetes, however, show no hyphal structure and can not be called fungi.

The vegetative stage of the slime moulds consists of the plasmodium, which is a naked mass of protoplasm, amoeboid in movement, found most frequently in forests upon decaying moss, leaves, wood, etc. The general character of the plasmodium has caused to be given to this organism the common name Slime-mould.

The fruit consists of simple or compound sporangia. The spores may be borne outside or inside the spore-bearing body. Besides the spores, the sporangia of the most of

the species contain filaments of various forms, called the capillitium.

Nearly 400 species, distributed among 50 genera, have been described. In the United States 200 or more species have been recognized. Macbride, up to the year 1894, had reported 75 species from eastern Iowa.

The classification is as follows:

Mycetozoa

1. Acrasieae
2. Myxomycetes
   (1) Exosporae
   (2) Endosporae
      a. Simple
      b. Compound

For my list of synonyms I have drawn largely from Macbride's North American Slime-Moulds.

For my determination of specimens I have consulted Saccardo's Sylloge Fungorum, Lister's A Monograph of the Mycetozoa, Massee's A Monograph of the Myxogasteres, and Macbride's North American Slime-Moulds.

Where I have used their authors' names in my descriptions with no further designation, the data have been taken from the above named books.

Alletta F. Dean.

University of Wisconsin
June 1, 1904.

CERATIOMYXA FRUTICULOSA (MUELL.) MACBR.

1729. Puccinia ramosa bifurcata, etc., Micheli, p. 213, Tab. 92, Fig. 2.

1775. Byssus fruticulosa Mueller in Fl. Dan., t.718,Fig.2.

1778. Tremella hydnoidea Jacquin, Misc., Vol. I., t. 16.

1783. Clavaria puccinia Batsch, Elench. Fung., p.139,Fig.19.

1791. Puccinia byssoides Gmelin, Syst. Nat., p. 1462.

1791. Clavaria byssoides Bulliard, Champ. de la France, t. 415, Fig. 2.

1794. Isaria mucida Pers., Rom.N.Mag.Bot., I., p. 121.

1801. Isaria mucida Pers., Syn. Meth., p. 688.

1805. Ceratium hydnoides Alb. and Schw., Consp.Fung.,p.358.

1829. Ceratium hydnoides Fries, Syst. Myc., p. 294.

1872. Ceratium hydnoides Woronin and Famintzin, Mem. Acad. Imp., St. Petersburg.

1887. Ceratium hydnoides De Bary, Comp. Morph. Fun., p. 432.

1889. Ceratiomyxa mucida Schroeter, Eng. u. Prautl Nat. Pflanz., I. i., p. 16.

1893. Ceratiomyxa mucida Macbride, Bull.Nat.Hist.Ia., II., p. 114.

1894. Ceratiomyxa mucida Lister, The Mycetozoa, p. 25.

Macbride: Plasmodium in rotten wood, white or nearly transparent; when fruiting, forming on the substratum mould-like patches composed of the minute sporiferous pillars, generally in clusters of three or more together; spores white, ovoid or ellipsoidal, smooth, 10-12x6μ .

Saccardo adopts the name Ceratium hydnoides (Jacq.) Alb. and Schw. He gives the color as white or yellow, and the spores as ovoid 10-12 by 8 μ, or globose 10 μ in diameter. He finds the spores to be minutely guttulate and hyaline.

Lister adopts the name Ceratiomyxa mucida Schroet. "Sporophores white or pinkish-yellow, membranous, either rising from a common hypothallus in a tuft of simple or forked, fasciculate obtuse branches, 1 mm. or more high, .07 mm. thick, or more or less interwoven in broad perforated bands, from which arise irregular and anastomosing lobes; the membranous wall is divided, chiefly on the upper part of the sporophore, into somewhat hexagonal areolae about 10 μ broad; a membranous stalk bearing the spore arises from the center of each areola. Spores 10x6 to 13x7 μ."

The above descriptions are excellent for this species. I find spores that are ovoid or ellipsoid, 8-11 by 6-8 μ, and globose ones 10-11 μ in diameter.

I found a small specimen of this species in Cemetery woods October 14, 1903. In February, 1904, some chips under a bell-jar in our Herbarium Room produced some of this species, giving me good material for microscope slides. April 25, 1904, in our greenhouse, a piece of decayed poplar 3 ft. by 6 in. suddenly became nearly covered with the fruiting-bodies. It looked like a small snow-drift and

was a beautiful sight. Since then this species has frequently appeared in the greenhouse. May 27 a quite large log of decayed poplar became nearly covered with this species of a clear sulphur yellow, excepting at one end of the log, where it was white. The yellow did not gradually fade out to white, but the colors were mixed together in spots for a short distance. Under the microscope the two kinds showed no differences. As the yellow kind dried or grew old it became white and no difference is now noticeable between the specimens.

FULIGO VARIANS SOMMF.

1753. Mucor septicus Linn., Sp. Pl. II., No. 1656 (?).

1763. Mucor ovatus Schaeff., Fung. Bav., p.132, Fig. 192.

1791. Fuligo septica (Linn.) Gmel., Syst. Nat., p. 1466.

1826. Fuligo varians Sommf., Fl. Lapl. Sup., p. 231.

1809. Aethalium flavum Link, Diss., I., p. 42.

1829. Aethalium septicum Fr., Syst. Myc., III., p. 93.

1875. Fuligo varians Sommf., Rost., Mon., p. 134.

1899. Fuligo ovata (Schaeff.) Macbr., N.-A. S.-M., p. 23.

Macbride adopts Schaeffer's name, F. ovata. "Plasmodium bright yellow; aethalium pale brown or yellowish brown, of variable size and shape, one to five inches in diameter, and one-half an inch to an inch thick, enclosed by a distinct calcareous crust, which varies greatly in texture, thickness, and color, anon brown, stout, persistent, sometimes thin, bright yellow, scarce recognizable; capillitium well developed but variable in color and extent; spore-mass dull black, sooty; spores spherical, purplish brown, smooth, 7-10μ."

Saccardo adopts the name F. septica (Linn.) Gmel. He speaks of the peridia as forming a common interwoven colored membrane, and says the color varies from deep yellow to white.

Lister adopts the same name as Saccardo. He calls the aethalia pulvinate, and adds: "The cortex is sometimes wanting, when the surface is gray and marked with brain-like convolutions. * * * Columella none. Capillitium a loose network of slender hyaline threads more or less expanded at the axils, with rounded, fusiform, or branching yellow or whitish lime-knots, varying much in size." He gives the size of the spores as 6 to 10μ diameter.

Massee adopts the name F. varians, Rost. He differs from the above descriptions in no point excepting the size of the spores, which he gives as 7-11μ in diameter.

The specimens which we have agree in general with the foregoing descriptions, the spores, however, being from 7 to 10μ in diameter. I find the aethalia of my specimens to be from 1 to 5 inches long and of varying widths.

This species seems to be quite common throughout the state. I have specimens growing upon oak and other bark, moss, grass stems, and one aethalium upon an oak leaf. They were found in the U. W. Campus woods and elsewhere in Madison in October, 1899 and 1903; in Nelson's woods August 22, 1903; at Star lake in August; Palmyra, July 3, 1903; Blue Mounds, August 8, 1903; Brule river, July 17, 1897, and near Webster in the summer of 1894. An aethalium also formed and ripened under a bell-jar in our Herbarium Room upon a piece of bark brought from Elmside woods in

the fall of 1903. The plasmodium of this specimen was at first a delicate creamy white, then just before aggregating into the aethalium it became yellow.

PHYSARUM SINUOSUM (BULL.) WEINM.

1791. Reticularia sinuosa Bulliard, Champ., p. 94, t. 446, Fig. 3.

1796. Physarum bivalve Persoon, Obs. Myc., I., p.6, t.1, Fig. 2.

1828. Physarum sinuosum Weinmann, Fries teste, l.c.

1829. Physarum sinuosum Fries, Syst. Myc., III., p. 145.

1875. Physarum sinuosum (Bull.) Rost. Mon., p. 112.

1892. Physarum sinuosum Rost., Massee, Mon., p. 305.

1894. Physarum bivalve Pers., Lister, Mycetozoa, p. 57.

1896. Angioridium sinuosum (Grev.) Morgan, Cin.Soc. Nat. Hist., p. 75.

Macbride: Sporangia distinct or plasmodiscarps, the plasmodiocarp creeping in long vein-like reticulations or curves, laterally compressed; sometimes distinct and crowded, always sessile. Peridium double; the outer thick, calcareous, fragile, snow-white; the inner delicate, the dehiscence by longitudinal fissure. Capillitium strongly developed with abundant white, calcareous granules. Spores smooth, dull violet 8-9 μ . Easily recognized at sight by its peculiar form, bilabiate and sinuous.

Saccardo credits the generic name of this species to Rostafinski. He calls the color snowy, grayish, or yellowish-white. The remainder of his description does not differ from Macbride.

Massee calls the spores very minutely verruculose.

Lister adopts the name P. bivalve Persoon. He finds the sporangia sometimes pulvinate, bursting irregularly, and white, gray, or yellowish. The spores he calls violet-brown, spinulose, and 8-10 μ in diameter.

The general character of my specimens is well described above. I find the three different colors in different specimens, the snowy -, grayish -, and the yellowish-white. The spores are from 7-10 μ in diameter and are distinctly though minutely spinulose.

One specimen found upon dead oak leaves on a lawn in Madison, July 20, '04 has a quantity of chondrioderma hemisphericum mingled with it. Another specimen was found upon dead oak leaves and small stems in Vilas woods, July 16, '04, and another upon dead leaves I found at Blue Mounds, July 23, '04.

PHYSARUM CONTEXTUM PERSOON.

1796. Diderma contextum Persoon, Obs. Myc., I., p. 89.

1801. Physarum contextum Persoon, Syn. Meth., p. 168.

1829. Diderma contextum Persoon Fries, Syst.Myc.,III.,p.111.

1873. Diderma ochroleuoum B. and C., Grev., II., p. 52.

Saccardo: Sporangia distinct, sessile, densely crowded, sub-rotund or reniform, base broad, 1-1.5 mm. long, .25 mm. wide; peridia double, outer layer thick, calcareous, yellow or yellowish white, inner layer thin yellowish; capillitium with numerous, irregular, closely packed, colorless, calcareous granules; columella commonly none; spores very dark, spinulose, 11-13μ diameter.

Macbride's description is almost identical with Saccardo's, but he adds that the outer peridium, especially its upper part, is entirely evanescent.

Lister says that the capillitium has scanty hyaline threads connecting the branching lime-knots. He calls the spores dark violet-brown. He states that Rostafinski was the first to detect and point out that in P. contextum the spores are rough and measure 10-13μ , while in P. conglomeratum they are nearly smooth and measure 8-9μ in diameter.

Massee differs from the above only in dimension of spores, which he finds to be 11-14μ in diameter. He says this species is known from P. conglomeratum by the denser

capillitium of numerous large, irregular lime-knots, and the larger sporangia usually of a pale lemon yellow, sometimes with a very faint tinge of green.

My specimens agree very closely with the above descriptions.

I have two specimens which I found in Cemetery woods in October, 1903, growing on and under poplar bark. One group is about one inch long by a third as broad, the other is about a fourth as large.

PHYSARUM NEFROIDEUM ROSTAFINSKI.

1805. Physarum compressum Alb. and Schw., Fung.Lus., p.97.(?)

1809. Physarum griseum Link, Diss., I., p. 27.

1829. Physarum cernuum (Schum.) (in part) Fries, Syst. Myc., p. 130.

1873. Didymium connatum Peck, Rep.N.Y.Mus., XXVI., p. 74.

1875. Physarum nefroideum Rost., Mon., p. 93.

1875. Physarum affine Rost., Mon., p. 94; App., p. 5.

1875. Physarum lividum Rost., Mon., p. 95.

1876. Didymium glaucum Phillips, Grev., V., p. 114.

1879. Physarum polymorphum (Mont.) Tost., Peck, Rep.N.Y. Mus., XXXI., p. 55.

1882. Physarum phillipsii Balfour Fil., Grev., X., p. 116.

1892. Physarum glaucum (Phill.) Massee, Mon., p. 284.

1892. Physarum nefroideum Rost., Massee, Mon., p. 285.

1893. Physarum Leucophaeum Fries, Macbride, Bull. Lab. Nat. Hist. Iowa, II., p. 156.

1896. Physarum connexum Link, Morgan, Jour.Cin.Soc., p. 92.

1896. Physarum confluens Pers., Morgan, l. c., p. 94.

Macbride: Sporangia gregarious, sessile, stipitate, or even plasmodiocarpus; when stipitate, globose, depressed, or anon reniform, usually concave or umbilicate below, the peridium strongly calcareous, cinereous-white; stipe variable, generally tapering upward, always distinctly deeply plicate-furrowed, varying in color from nearly pure white,

through different shades of gray to brown fuliginous or black; hypothallus none or obscure; columella none; capillitium abundant, the white lime-knots varying in size and shape, connected by rather long hyaline threads, with here and there an empty node; spore-mass black, by transmitted light, dark, sooty brown, minutely papillose, 10-11.5μ .

Macbride says also that while normally stipitate, it often shows from the same plasmodium all sorts of forms. The amount of lime also varies, especially in the capillitium, where there is always a tendency to the formation of something like a pseudo-columella.

Lister adopts the name P. compressum Alb. and Schw. He describes the sporangia as erect, splitting along the upper ridge, scattered, closely aggregated or confluent. The stalk never has chalk-white fracture at the base. He finds the spores to be dark purplish-brown, more or less spinulose or echinulate and from 9-14μ in diameter. He finds much difference in size and roughness of the spores in sporangia from the same cultivation. He finds also American specimens, with nearly globose sporangia, and buff or white, long or short, stout stalks, and says that these forms are more symmetrical than European forms.

The description in Saccardo of the species P. compressum A. S., with the synonym P. nephroideum Rost., and the description in Massee of the species P. nefroideum, Rost.,

are identical, and offer no material departure from the above. This description however calls the spores globose or angularly subglobose, 11-13μ in diameter, minutely verruculose.

The abundant material which I have agrees with Macbride's description excepting that I find the spores to be 9-11μ in diameter.

My specimens are upon the bark and wood of decayed poplar. I have specimens from Blue Mounds gathered October 12, 1901; from Dead lake October, 1903; and several gatherings from Cemetery woods the last ten days of October, 1903.

LEOCARPUS FRAGILIS (DICKS.)ROST.

1785. Lycoperdon fragile Dickson, Fasc.,Pl.Crypt.Brit., I., p. 25.

1795. Diderma vernicosum Pers. Ust. Ann. Bot., XV., p. 34.

1809. Leocarpus vernicosus Link, Diss., I., p. 25.

1875. Leocarpus fragilis (Dicks.) Rost., Mon., p. 132.

Saccardo: Peridia aggregated, sessile or stipitate, obovoid rarely subrotund, yellowish - or reddish-brown, polished, stipe filiform, ascending, white or yellowish; spores globose, dusky-dark, spinulose, 12-14 μ in diameter.

Macbride calls the sporangia rusty or brownish-yellow, opening in a somewhat stellate fashion. He describes the stipe as weak and short, and the spores as dull black. He says the sporangia are recognizable at sight as they resemble the eggs of certain insects. The capillitium he states, is of two more or less distinct systems, the one a delicate network of hyaline, limeless, limeless threads, the other calcareous throughout, or nearly so, the meshes large and the threads or tubules broad.

Lister adopts the name L. vernicosus Link. He says of the capillitium that it is a network of rigid hyaline threads with flattened expansions at the axils and with few lime-knots, connected with a system of coarse branches often combined into a dense network and charged throughout

with brownish lime-granules. He finds the spores occasionally 15-20μ in diameter, rarely clustered as in Badhamia.

Massee finds sometimes several sporangia more or less grown together.

For the capillitium as I find it Lister's description is very good. The reticulated hyaline threads are continuations of the coarser reticulated threads containing yellowish lime granules. There are not two distinct systems of capillitium threads as I see them. I find the spores to be dusky purplish, distinctly warted, and from 9-15 μ in diameter. The weak white stipes are quite often united, sometimes as many as five making a thin expanded common stipe. The sporangia seem to open irregularly.

Some of this species were found at the Brulé river, July 19, 1897, growing upon dead leaves and twigs.

One specimen which I have was found July 13, 1904, in Cemetery woods growing upon decayed wood; another found July 16, 1904, in Vilas woods is upon decayed wood and a thin layer of green moss growing on the wood. July 21, 1904, I found several specimens in Cemetery woods, some upon wood, some upon bark, and one very beautiful group about 2 in. long and a third as wide upon a thin curled dead oak leaf upon which was also a group of Diachea leucopoda. A fine group of the sporangia was found grow-

ing upon the bark of a little thrifty hard maple tree about 6 in. from the ground, at Blue Mounds, July 23, 1904.

SPUMARIA ALBA (BULL.) D C.

1783. Mucor spongiosus Leysser, Fl. Hal., p. 305.

1791. Reticularia alba Bulliard, C. Fl. France, p. 92.

1791. Spumaria mucilago Persoon, Gmel., Syst. Nat.,III, p. 1466.

1897. Mucilago spongiosa (Leyss.)Morgan,Bot.Gaz.,XXIV.,p.56

Saccardo: Aethalia grayish-white, 2-6 cm. long, 2-3 cm. wide, spongy; columella hollow, cylindrical, branched, not reaching the apices of the peridia, capillitium threads thick, branched, with much thickened nodules; spores spinulose, dark violet, 10 μ in diameter.

Macbride adopts the name Mucilago spongiosa (Leyss.) Morgan. He speaks of the component sporangia as resting upon a common hypothallus and being protected by a more or less deciduous calcareous porous cortex. He calls the columella indefinite or none, the hypothallus white,spongy. He finds the spore-mass black, the spores violaceous, exceedingly rough, large, 10-15 μ in diameter. In fruiting, the plasmodium, he states, ascends preferably living stems of small bushes, herbaceous plants, or grasses, and forms the aethalium around the stem some distance above the ground.

Lister finds the aethalia to be 2 to 4 cm. long, 1 to 2 cm. wide, and about 1 cm. thick, which agrees with the measurements of my specimens. He finds the columella to

be sometimes absent. The capillitium is a network of widely branching, anastomosing, stout, purplish-brown threads, with numerous dark calyciform thickenings, hyaline at the extremities. This statement I find to be true, the thickenings on the capillitium threads being quite distinctive. The spores he makes out to be dull purple, strongly spinulose, 10 to 13 μ in diameter.

Massee does not differ from the above.

My specimens agree with the descriptions given, very closely. They vary in length from 1-1/2 to 4 cm. The spores are dark violet, strongly spinulose, from 12 to 15 μ in diameter.

Three specimens surrounding small stems were found in Madison, Oct. 14, 1899, two in the Campus woods July 14, '04. One of the latter is nearly globular and is formed on the extreme end of the stem of a dead oak leaf; the other is irregular upon the base of another dead oak leaf. The other specimen which I have nearly surrounds a hard-wood twig, and was found at Blue Mounds, July 23, 1904.

BREFELDIA MAXIMA (FRIES) ROST.

1825. Reticularia maxima Fries, Syst. Orb. Veg., I., p. 147.

1875. Brefeldia maxima (Fries) Rost., Versuch., p. 8.

Saccardo: Aethalia nude, surface warted, purplish-black, resting upon a well developed silvery-shining hypothallus; 3 to 6 cm. long and wide, 5-10 mm. thick; spores purplish to brownish dusky black, globose, spinulose, 11-12 μ diameter.

Macbride calls the aethalia papillate above. He says the sporangia in favorable cases are distinct, indicated above by the papillae; columellae obscure, black; capillitium abundant, the threads united by multifid ends to surround as with a net the peculiar vesicles. He gives the size of the spores as 12-15 μ and calls them distinctly papillose. He states that in well matured aethalia the sporangia stand out perfectly distinct, particularly above and around the margins. In the center of the fructification, next the hypothallus, the sporangia are very imperfectly differentiated. * * * Each filament bears at its middle point a peculiar plexus which embraces several large cysts or vesicles.

Lister speaks of the spongy basal tissue continuing among the sporangia as folds forming distinct rigid columellae.

Massee speaks of the surface as being rough with irregular wart-like nodules. He gives the diameter of the spores as 13-17 μ. He adds: "Forming large pulvinate patches of irregular form varying from 1-6 inches across."

This species is easily determined by the papillate character of the surface and the peculiar character of the capillitium, which is well described by Macbride. I find the spores to be 10-12 μ in diameter. We have but one specimen, which was found in Madison in October, 1882, growing upon what seems to be a mass of half-decayed leaves.

STEMONITIS SMITHII MACBR.

1893. Stemonitis smithii Macbr., Bull. Lab. Nat. Hist. Ia., II., p. 381.

1894. Stemonitis microspora Lister, Morg., Jour.Cin.Soc., p. 54.

Macbride: Sporangia in clusters, close packed and erect, not spreading, bright ferruginous prior to spore dispersal, cylindric, stipitate, of varying height; stipe jet black, shining, about one-third the total height; hypothallus generally well developed; columella black, gradually tapering, at length dissolving in capillitial threads and net some distance below the diminished plumose apex; capillitium of fuscous threads, the inner network of sparingly united branches uniformly thickened, the surface net composed of small, regular, polygonal meshes, the peridial processes few; spore-mass bright ferruginous, spores by transmitted light pale, almost colorless, smooth, 5-7μ. The species as now constituted includes forms varying in size from 2.5-25 mm.

Lister: Plasmodium white. Total height 7 to 12 mm. Sporangia cinnamon-brown. Stalk 3 to 6 mm. long, arising from a membranous hypothallus. Capillitium as in S. ferruginea, but the superficial net has rounded, more regular meshes, 5 to 10μ diameter, and the threads of the meshes are often rather stout. Spores 4 to 6μ diameter.

My specimens do not agree entirely with the above descriptions, but neither do they agree with that of S. ferruginea. The sporangia are from 7 to 12 mm. tall, but the stems are not over one-fourth the entire height. Many nodes of the inner network are broadened somewhat. The meshes of the outer net are not regular, and they vary from 5 to 14 μ in diameter. The spores are as Macbride states, 5 to 7 μ in diameter. The other characteristics, however, leave this species, without doubt, where I have placed it.

One of my specimens was found growing upon much decayed wood in Madison, October, 1901, one was found upon bark near Tomahawk, and a third upon wood near the Whirlpool rapids of the Wisconsin, in the summer of 1893.

COMATRICHA LONGA PECK.

1890. Comatricha longa Peck, Rep. N.Y. Mus., 43, p. 70.

Peck: Stems growing from a shining membranous hypothallus, closely gregarious, penetrating the peridia as a columella, capillary, black; peridia narrowly cylindrical, generally elongated, 12-40 mm. long, often flexuous, very fugacious, grayish-black; capillitium rising from the columella, its branches generally somewhat reticulately connected near their base and forming a few large meshes, externally divided into slender, sharp-pointed, divergent, spine-like branchlets, with free apices, blackish; spores globose, even, .0003 to .00035 in. in diameter.

Macbride describes this species as having sporangia crowded in depressed masses or tufts. He says the stipe is generally very short and the hypothallus black. He calls the spore-mass blue-black and the spores by transmitted light dark brown, globose, warted, and about 9 μ in diameter. He says the sporangia though generally about 20-25 mm., occasionally reach 50 mm.

Lister has the further fact that the columella is wavy, with angular flexures in the upper part, tapering in breadth from 20 μ at the base to 2 μ near the summit, and that the terminal branches of the capillitium are rigid and fork at an acute angle. He calls the spores dark gray, spinulose, the spines usually connected by faint

lines forming a reticulation.

Massee puts this species in the genus Stemonitis, calling it S. longa, Mass. He finds the axils of the capillitium branches usually rounded, and often occupied for some distance by a thin membrane, sometimes connected laterally. He finds the spores to be very minutely reticulated, 7-8 μ in diameter.

The specimen which I have shows the general characteristics as described above. The sporangia are from 30-40 mm. long. The authorities ~~which~~ whom I have quoted differ in regard to the epispore. I find the spores to be finely reticulated, but by very narrow bands so much raised above the surface as to look along the border like a regular row of sharp spines. I find the spores to be dark brown and 9 μ in diameter.

My one specimen I found in the Campus woods near the lake, growing upon smooth bark, in October, 1903.

COMATRICHA NIGRA (PERS.) SCHROETER.

1791. Stemonitis nigra Pers., Gmel., Syst. Nat., p. 1467.
1801. Stemonitis ovata, var. nigra Pers., Syn., p. 189.
1851. Comatricha obtusata Preuss, in Linnaea XXIV, p. 141.
1863. Stemonitis friesiana De By., Rab. Eur. Fung., No.568.
1875. Comatricha friesiana (De By.) Rost., Mon., p. 200.
1889. Comatricha nigra (Pers.) Schroeter, Pilz. schles., p. 118.

Macbride: Sporangia scattered, ferruginous or dark brown, globose or ovoid, stipitate; stipe long, hair-like, tapering upward, black; hypothallus none; columella rapidly diminishing toward the top, at length dissipated; capillitium of slender flexuous threads, radiating horizontally, repeatedly branching and anastomozing to form an intricate dense network, from the surface of which project a few short hook-like peridial processes; spore-mass black, spores by transmitted light dark violaceous, smooth or nearly so, 7-10 μ in diameter. This species is easily recognized by its almost globose sporangia mounted on long slender stocks. These are 2 or 3 mm. high and generally persist a long time afer the sporangium has fallen.

Saccardo adopts the name C. friesiana (De By.) Rost. He does not differ from Macbride in his description.

Massee adopts the name Stemonitis friesiana, De Bary.

He states that the sporangium wall is very thin, disappearing, whitish with a silver sheen or purple black. He also speaks of the stem expanding at the base into a small, circular, irregularly ribbed or latticed hypothallus. The wall I have not seen. The hypothallus as he describes it shows plainly under the microscope, but is not noticeable without a lens.

Lister adopts the name C. obtusata Preuss, for what is evidently this species. He gives the total height as from 1 to 6 mm., the color as purplish-brown. He finds the capillitium threads anastomosing and branching in semicircular curves. This character of the branching I do not find to be constant. The spores he describes as nearly smooth, or minutely and closely spinulose.

I find the globose or ovoid sporangia with their long stipes quite determinative; and the long slender columella with the capillitium threads freely branching from its entire length, prevents its being taken for a Lamproderma. It agrees in general with the descriptions given above, though I find the spores smooth or nearly so, not spinulose.

Our one specimen I found growing upon a small very hard decorticated oak branch in Campus woods July 18, 1904.

COMATRICHA STEMONITIS (SCOP.) SHELDON.

1772. Mucor stemonitis Scopoli, Fl. Carn.,II.,pp. 493-494.

1774. Mucor stemonitis Schaeffer, Icones. Tab.,CCXCVII.

1780. Stemonitis typhina Wiggers, Prim. Fl. Hols., p.116.

1791. Trichia typhoides Bull. C. de la Fr., p. 119, t.477, II.

1796. Stemonitis typhina Pers. Myc. Obs.,I., p. 57, in part.

1805. Stemonitis typhoides(Bull.) D.C., Fl. Fr., p. 257.

1829. Stemonitis typhoides (Bull.) Fr.,Syst. Myc.,III., p. 158.

1873. Comatricha typhoides (Bull.) Rost., Vers., p. 7.

1875. Comatricha typhina (Pers.) Rost., Mon., p. 197.

1895. Comatricha stemonitis (Scop.) Sheldon, Minn. Bot. Stud., p. 473.

Macbride: Sporangia gregarious, scattered, cylindric, erect, sometimes arcuate, obtuse, 2-3 mm. high, at first silvery, then brown, as the peridium vanishes, stipitate; stipe black, about one-half the total height or less; hypothallus distinct, more or less continuous, reddish brown; columella tapering upward, black, attaining more or less completely the apex of the sporangium; capillitium arising as rather stout branches of the columella, soon taking the form of slender, flexuous, brownish threads, which by repeated anastomosing form at length a close network, almost as in Stemonitis, the free, ultimate branches

very delicate and short; spore-mass dark brown; spores by transmitted light, pale, almost smooth, except for the presence of a few scattered but very prominent umbo-like warts, of which four or five may be seen at one time, 5-7.5 μ .

Lister adopts the name C. typhoides Rost. He gives but little in his description differing from the above. He says the capillitium varies in the closeness of the network, and that forms occur in which the threads are less flexnose. He finds the spores to be pale lilac-brown, marked with 3 to 5 dark, flattened warts on the hemisphere, and 3.5 to 7 μ in diameter.

Saccardo adopts the name C. typhina (Roth.) Rost. He calls the spores smooth and from 4.5 to 5 μ in diameter.

The specimens which I have agree very closely with Macbride's description. The sporanges are quite regularly scattered over a space of about 3 in. by 4. Remains of the violet-tinted peridium are upon the apices of many of the sporanges. The spores are quite determinative - the few umbonate warts being very characteristic.

One specimen was found growing upon dead soft wood, at Edgewood, Madison, July 18, 1903; two at Elmside July 15, 1904, one being upon a much decayed oak stump and the other upon a dead poplar log; another upon the inside of poplar bark found in Cemetery woods July 21, 1904, and another upon poplar wood found in the Campus woods July 22, 1904.

COMATRICHA FLACCIDA (LISTER) MORGAN

1894. Comatricha flaccida List. Morgan, Jour.Cin.Soc., p.51.
1894. Stemonites splendens, var. flaccida List.,Myc.,p. 112.

Macbride: Sporangia semi-erect, close crowded in tufts an inch or two in diameter, ferruginous, from a dark brown hypothallus, sessile or short stipitate; columella weak, crooked, percurrent, generally enlarged irregularly at the apex; capillitium of few, slender, brown branches which anastomose sparsely and irregularly; spore-mass ferruginous brown; spores by transmitted light bright reddish brown, minutely warted, 8-10μ .

Lister adopts the name Stemonitis splendens Rost., but although Macbride gives this name (var. flaccida) as a synonym, Lister's description does not agree very well with either Macbride's description or my specimen. Lister says the plasmodium is creamy white, maturing at the place of emergence, which I find to be true. He says the sporangia are at first closely fasciculate. I find them persistently so at and after maturity. He describes a superficial net of the capillitium which I fail to find, and the lack of which causes Macbride to place this species in the genus Comatricha. My specimen agrees with Macbride's description.

I have one specimen, growing upon poplar wood, found in Cemetery woods October 22, 1903.

DIACHEA LEUCOPODA (BULL.) ROST.

1791. Trichia leucopoda Bulliard, Champ. de la Fr. Pl. 502, Fig. 2.

1825. Diachea elegans Fries, Syst. Orb. Veg., I., p. 143.

1875. Diachea leucopoda (Bull.) Rost., Mon., p. 190.

Saccardo: Peridia cylindrical, obtuse, stipitate; stipe short, base thickened, snow-white, lengthened within the peridium into a white cylindrical columella which does not reach the obtuse vertex of the peridium; capillitium threads white, slender; spores dark violet, iridescent, 6-8 μ in diameter.

Macbride adds to the above characteristics that the sporangia are rather closely gregarious, metallic blue, or purple iridescent, cylindrical or ellipsoidal and sub-umbilicate below. The hypothallus is white, venulose, occurring from stipe to stipe to form an open network over the substratum. The capillitium threads he calls brown, which agrees with the specimens which I have. The spores in mass he finds to be nearly black. I find them slightly iridescent. The spores he calls dull violaceous, minutely roughened, 7-9 μ in diameter. The peridium is exceedingly thin and early deciduous; the stipe long persistent.

Lister adopts the name D. elegans Fries. He finds the stalk to be stout, brittle, furrowed, one-third or

one-half the height of the sporangium. He finds the capillitium of profusely branched and anastomosing threads connecting the columella with the sporangium-wall, dark violet-brown, colorless at the extremities. The spores he calls minutely spinulose.

Massee adds nothing new to the above descriptions.

I find this beautiful little species easily determined from its very white stipe and its dark iridescent sporange. The whole sporange is quite likely to disappear early, leaving sometimes a large number of the white nearly conical stipes without a single sporange to show what it had been. I have a specimen gathered at Blue Mounds, Aug. 18, '03 of which this is true; the white stipes covering the setae of a green moss. Two specimens in which this species was growing upon leaves, grass, moss and small twigs were found opposite Fond du Lac, July 28, 1897. Not many of the sporanges remain upon the stipes of these. I found some fine specimens in Cemetery woods July 21, 1904, and two lots of them were found at Blue Mounds July 23, 1904. Of these last some were growing upon a piece of dead twig which was about three-fourths of an inch through, some upon a living green fern frond, and a great quantity upon dead leaves which had lodged beside a decayed log. Specimens found in Vilas woods, July 28, 1904, include one group growing upon a thick dead oak leaf, the hypothallus in this showing its venulose character very beautifully.

LAMPRODERMA VIOLACEUM (FRIES) ROST.

1829. Stemonitis violacea Fries, Syst. Myc., III., p. 162.
1875. Lamproderma violaceum (Fries) Rost., Mon., p. 204.

Macbride: Sporangia closely gregarious or scattered, depressed globose, more or less umbilicate below, metallic blue or purple, sessile or short stipitate; stipe stout, dark brown or black, even; hypothallus, when the sporangia are crowded, a thin, continuous, purplish membrane; when the sporangia are scattered, the hypothallus discoidal; columella cylindric or tapering slightly upward, the apex obtuse, black, attaining the center of the sporangium; capillitium lax and flaccid, made up of flexuous threads branching and anastomosing to form a network, open in the interior, more dense without, the threads at first pale brown as they leave the columella, becoming paler outward to the colorless tips; spores minutely warted, violaceous gray, 9-11 μ . When the sporangia are empty the pallid extremities give a whitish appearance to the little spheres. Only when the spores are ready for dispersal does the peridium assume its rich metallic purple tints.

Saccardo's description does not differ from the above.

Lister speaks of the capillitium threads as springing from the upper part of the columella. He gives the total height of the fruit-body as .6 to 1.5 mm.

Massee says the branches of the capillitium spring from the apex and sides of the columella. He calls the spores smooth and 9-12 μ in diameter.

I find Macbride's description to be the most satisfactory. The peridium is evanescent, but the fragments remaining are of an intense metallic violet-blue. The capillitium is attached almost entirely to the top of the columella, the points of attachment not extending below the rounded edges of the truncated top. The spores I find violaceous, evidently warted, and 9-11 μ in diameter.

The large groups of this species were found at the mouth of the Brulé River, July 17, 1897, growing upon the stems of green moss.

RETICULARIA LYCOPERDON (BULLIARD).

1791. Reticularia lycoperdon Bulliard, Champ. de la France, p. 95.

Saccardo: Spores, columella, and capillitium brown, cortex also of the same color, opaque thin, silvery-smooth or unequally covered with warts; spores reticulated upon half their surface, 8-9 μ in diameter.

Macbride's description is much more complete than the original description quoted above. "Aethalium pulvinate, 2-8 cm. broad, at first silvery white, later less lustrous, the cortex irregularly and slowly deciduous; hypothallus at first conspicuous as a white margin extending round the entire aethalium, evanescent without, but persisting as a firm membrane beneath the spore-mass; spore-mass umber." He calls the reticulated portion of the spore-surface about two-thirds, and says the remaining portion is slightly warted.

Lister describes the capillitium as consisting of the persistent remains of the sporangium-walls, forming irregular chambered and branching strands arising from the hypothallus, dividing above into numerous delicate flattened and flexuose threads. He speaks of the spores as somewhat turbinate, thickened and closely reticulated on the rounded side, the remaining part marked with scattered warts. He

gives their size as 6 to 8μ diameter.

Massee describes the color as varying from dull umber, through reddish-brown to pale gray with a silver lustre. He also speaks of the slender anastomosing branches of the capillitium. He calls the spores 7-9μ diameter.

The one specimen which I have is about an inch and a half long, a beautiful silvery white, cortex slightly roughened. Lister has described the character of the capillitium as I find it, quite exactly. I find the spores also as he describes them, appearing turbinate in some positions; but the reticulated portion is more nearly two-thirds than a half, as given in the original description. The edge of the reticulated portion stands out from the remainder of the surface in quite a marked way, as if a part had been cut off. I find the spores to be from 7-11μ in diameter.

This specimen was found growing upon the bark of an erect maple in Madison, October 18, 1901.

ENTERIDIUM ROZEANUM WING.

1889. Enteridium rozeanum (Rost.) Wingate, Proc. Phil. Acad., p. 156.

1892. Enteridium rozeanum Wingate, Macbr., Bull. Lab. Nat. Hist. Iowa, II., p. 117.

1893. Reticularia splendens Morg., Jour. Cin. Soc., p. 11.

1899. Enteridium splendens Morgan, Morgan in litt.

Massee gives Wingate's original description, which I quote in part: "Aethalium of irregular shape, globose, ovoid, or rounded-pyramidal, attached to the substratum by a wide base. Variable in size from 5-30 mm. in diameter. Cortex and mass of spores ferruginous brown; occasionally the cortex shining; sometimes membranous, pellucid. * * * The walls of the sporangia (which form a capillitium) membranous, pellucid, band-like, combined into an all-sided network attached uniformly to all sides of the cortex. The bands have triangular or polygonal expansions at the angles where they join each other. Spores globose, about two-thirds of the surface covered with a delicate, regular, fine-meshed network, the remainder with simple warts or elongated ridges. * * * Spores measure 7.5-9 μ."

Macbride adopts the name given by Morgan, E. splendens. His description adds to the excellent one given above: "Aethalium pulvinate, even, or somewhat irregular, unevenly swollen or inflated, lobate or compound, covered by an ex-

ceedingly thin, generally smooth, shining, but never white pellicle or cortex; * * * hypothallus white, often wide extending. * * * Easily distinguished by its brown color and smooth, shining, though uneven surface."

Lister does not differ from the above. The foregoing descriptions are very satisfactory. I have found small specimens of this species growing in the midst of Lycogala epidendrum of about the same size. There was however no difficulty in distinguishing them apart. The Enteridium rozeanum has generally a broader base, and always more or less of a thin light brown, often white, hypothallus partly or wholly surrounding it. The surface too is more irregular and of a redder-brown than the Lycogala. Many are pulvinate and lobed. Those I have, vary from 1/2 to 6 cm. in length. I find the spores to be more regularly globose than those of Reticularia lycoperdon, and less of the surface reticulated— not more than a half, with the rest of the spore minutely roughened; spores 7-9 μ. We have two specimens from Wisconsin which do not have the exact locality and date given; one from near Webster upon dead wood, collected in the summer of 1894; one from Blue Mounds, October 4, 1902; three from Madison, 1901; several marked Madison, October 14, 1897; several, Madison, October 19, 1901; and a large number from Cemetery woods, Madison, October 20, 1903. Many of the latter show large tubules,

whitish inside, extending to or above the surface, which have been made by insects. In some of these tubules the dead insect is still to be found. Macbride says in his description, "capillitium none," yet on Plate I. of the same book he gives a figure which he, on the opposite page, calls the capillitium of this species. The illustration agrees with the structure which I find in the interior of the aethalia.

LINDBLADIA EFFUSA (EHR.) ROST.

1818. Licea effusa Ehr., Sylv. Myc. Ber., p. 26.
1875. Lindbladia effusa (Ehr.) Rost. Mon., p. 223.
1879. Perichaena caespitosa Peck., Rep. N. Y. Mus., p. 57.

Saccardo: Aethalia nude, upon a common well developed hypothallus, cortex very early becoming dry and dark, thick, brown, shining, wrinkled; spore-mass ochraceous or umber-brown; spores clear, brownish, smooth 6-7μ .

Macbride gives a fuller description than the foregoing. "Sporangia minute, either closely combined and superimposed, so as to form a pulvinate aethalium, or crowded together in a single layer, sessile or short stipitate; the peridia thin, membranous, marked by scattered plasmodic granules, often lustrous, sometimes dull lead-colored or blackish, especially above; stipe, when present, very short but distinct, brown, rugulose." He calls the spores nearly smooth, almost colorless, 6-7.5μ in diameter. He adds that the sporangia are sometimes free and even short stipitate. In the more complex phase the sporangia are heaped together in a pulvinate mass. The hypothallus is a prominent feature.

Lister adopts the name L. Tubulina Fries. His description varies little from the foregoing. He speaks of the sporangium-wall as membranous, yellow-brown, uniform,

beset with scattered clusters of dark, round, plasmodic granules, 1 μ diameter. He calls the spores faintly warted, 4 to 6 μ in diameter.

Massee makes this species a Tubulina. (Tubulina effusa, Mass.) His description contains nothing different from the above except that he calls the spores yellowish-brown, very indistinctly verruculose, 6-8 μ in diameter. And adds: "Often forming compact, flattened cakes extending for three or four inches."

We have fine specimens upon moss and the decayed wood on which the moss grew; the masses are from one-half to two and one-half inches long, the most of each mass in a single stratum and thin, but in some places the sporangia are superimposed; the hypothallus is very marked but not extending beyond the sporangia; sporangia not noticeably wrinkled; capillitium none; spores almost colorless faintly warted 6 to 7 μ in diameter.

These specimens were collected near Wausau in the summer of 1894.

TUBIFERA FERRUGINOSA (BATSCH) MACBR.

1786. Stemonitis ferruginosa Batsch, Kleuch.,p.261, fig.175.

1791. Sphaerocarpus cylindricus Bull., Champ., p. 140, t. 470, III.

1791. Tubifera ferruginosa Gmelin, Syst. Nat., p. 1472 (ex parte).

1805. Tubulina cylindrica (Bull.) D. C., Fl. Fr., 671.

1875. Tubulina cylindrica (Bull.) Rost., Mon., p. 220.

1894. Tubulina fragiformis (Pers.) Lister, Mycetozoa, p.153.

Macbride: Sporangia crowded, cylindric or prismatic, elongate, connate, more or less distinct above, pale umber brown, generally simple though occasionally branched above, the peridia thin, sometimes fragile, but generally persistent, transparent, iridescent; hypothallus strongly developed, spongiose, white, often projecting beyond the aethalioid mass of sporangia; spore-mass umber brown or ferruginous; spores by transmitted light almost colorless, plainly reticulate over three-fourths of the surface, 6-7μ .

Not rare on old logs, mosses, etc., from Maine to Alaska. Apparently more common north than south. Easily known by its long, tubular sporangia packed with rusty spores and destitute of any trace of columella or capillitium, the hypothallus explanate, rather thick, but not columnar. A single plasmodium may give rise to one or several colonies, at first watery or white, then red, of some-

what varying shades, then finally umber brown.

Macbride goes on to say that the peridia are sometimes acuminate, and widely separate above. In most cases however the peridia are connate throughout, and sometimes present above a membranous common covering.

Saccardo adopts the name Tubulina cylindrica (Bull.) D. C. He calls the spores 5-6μ in diameter.

Lister gives this species the name Tubulina cylindrica Rost. He differs from the above description in his measurement of the spores, which he gives as 7-9μ in diameter. He also says that the sporangia when immature and pulpy are of a beautiful strawberry color.

The two specimens which I have were found in Watertown, August 31, 1903. They were growing quite close together upon the end of a decayed piece of wood. They are well rounded masses about two-thirds and seven-eighths of an inch in diameter respectively, each upon an inconspicuous white hypothallus. When found they were bright red. When fully ripe they became umber brown. Macbride's description is accurate for these specimens.

Later - July 9, 1904, a mass of this species nearly covering a space 4 by 5 in. was found growing upon much decayed wood at Blue Mounds. Another small specimen I found at Blue Mounds July 23, 1904.

TUBIFERA STIPITATA (BERK. & RAV.) MACBR.

1868. Licea stipitata Berk. and Rav., Jour. Linn. Soc., X., p. 350.

1875. Tubulina stipitata (Berk. and Rav.) Rost.

Macbride: Sporangia crowded in a globose or more or less hemispheric, expanded head, borne upon a spongy, stem-like, sulcate hypothallus, their apices rounded, their walls very thin, evanescent; spores in mass umber brown, small, about 5 μ, the epispore reticulate as in T. ferruginosa. This species differs from T. ferruginosa chiefly in the cushion-like receptacle on which the crowded sporangia are borne, and in the smaller spores.

Saccardo adopts the name Tubulina stipitata (Berk. and Rav.) Rost. He differs from the above in calling the spores delicately warted.

Lister adopts the name Tubulina stipitata Rost. He finds the spores to be minutely reticulated over the greater part of the surface, the remaining part smooth or marked with ridges, and 3 to 5 μ in diameter.

Massee adopts the same name as Lister. He describes the spores as having about three-fourths of the surface covered with a regular small network, the remainder with much larger meshes.

I find the distinctive points of this species to be the stem-like hypothallus, and the small size of the spores.

The spores are finely reticulated over the greater part of the surface, the remainder having a very irregular network of rather coarse ridges.

The one group of specimens which I have was found in Vilas woods, July 16, '04, growing upon much decayed oak.

CRIBRARIA AURANTIACA.

1797. Cribraria aurantiaca Schrad., Nov. Gen. Pl., p. 5.

Saccardo: Peridium gregarious, spherical, more or less cernuous, stipitate, tawny to dark tawny; stipe attenuate above, dusky; calyculus well developed, hemispherical, the margin armed with short acute teeth; nodules commonly much branched, the apices prolonged so as to at length join with one another; spores from pale golden to dusky yellow, smooth, 5-6 μ in diameter.

Macbride adds a very important distinction - that the calyculus is more or less distinctly marked by fine delicate radiating venules. He finds that the net forms rather large three to five sided meshes with small, irregular brownish nodules and showing only here and there a free extremity. He also states that this species is generally recognized by the large sporangia, .5 - .9 mm., the comparatively short stipe, simple net, and more or less orange color, the color being uncertain.

Lister describes the calyculus as one-third the height of the sporangium, and beset with round plasmodic granules .5 to 1 μ in diameter, arranged in close lines radiating from the base. I find this description very good for the character of the calyculus.

Massee adds that the sporangia are scattered which I find to be true. They are never crowded.

My specimen agrees with the above descriptions. Among the ripe sporangia I found a small quantity of small intensely black and shining droplets, which may have been immature sporangia. Many of the ripe ones which had not lost their spores had a tiny black spot on top. I tried to have the black droplets develop in a moist-chamber, but they at once became covered with a white mould and failed to develop.

I made a large gathering of this species from a decayed oak stump at Elmside, Madison, July 15, 1904. We have no other specimen of it.

CRIBRARIA TENELLA SCHRADER

1797. Cribraria tenella Schrad., Nov. Gen. Pl., p. 6.

Macbride: Sporangia gregarious, small, .4-.5 mm. in diameter, olivaceous or ochraceous, long-stipitate, nodding; stipe slender, dark brown or blackish, very long, reaching 6 mm., weak and flexuous; calyculus variable, sometimes well defined, brown, costate, sometimes represented by the costae only connected by a thin, transparent membrane; net well differentiated, the meshes small, irregular, the nodes small, black, more or less globular, prominent, connected by transparent threads with occasional or numerous free ends; spores in mass olivaceous-ochraceous, under the lens pallid, globose, smooth, 5-7μ . Generally easily recognized by its very long stipe, small globose sporangium dotted with numerous small roundish nodules projecting plainly above the general surface. The obconic calyculus is always represented in the outline, if not in definite structure.

Lister calls the cup one-third the height of the sporangium, or more or less obsolete. The nodes are connected by three to six very slender threads, and few or no rays.

Massee finds the calyculus occupying about half the sporangium, often perforated above.

The description of Saccardo does not differ essentially

from the above.

The specimens which I have agree with the above descriptions in general. The calyculus is variable, as Macbride has said.

This one collection of specimens was found in Madison, May, 1902, growing upon much weather-worn soft wood, mixed with the ripe sporangia of Hemiarcyria clavata.

DICTYDIUM UMBILICATUM SCHRAD.

1789. Mucor cancellatus Batsch, Eleuch. Fung., II.,p.131.
1797. Dictydium umbilicatum Schrad., Nov. Gen. Pl., p.11.
1801. Cribraria cernua Pers., Syn., p. 189.
1816. Dictydium cernuum Nees, Syst. d. Pilz., p. 117.
1875. Dictydium cernuum (Pers.) Rost., Mon., p. 229.
1893. Dictydium longipes Morgan, Cin.Soc. Jour., p. 142.
1899. Dictydium cancellatum (Batsch) Macbr. N-A. S-M.p.172.

Macbride adopts the name D. cancellatum (Batsch) Macbr. He gives, on the whole, the best description, which is as follows: Sporangia gregarious, depressed globose, nodding, the apex at length umbilitate, stipitate, in color brown, or brownish purple; the stipe varying much in length from two to ten times the diameter of the sporangium, attaining 5-6 mm., generally erect, more or less twisted and pallid at the apex, below dark brown, with hypothallus small or none; calyculus often wanting, when present a mere film connecting the ribs of the net; the net made up chiefly of meridional ribs connected at intervals by transverse parallel threads, above an open Cribraria-like network closing the apex and more or less rudimentary; the spores varying in color through all shades of brown and purple when seen in mass, by transmitted light reddish, 5-7 μ, smooth or nearly so.

Saccardo adopts the name D. cernuum (Pers.) Nees.

He calls the spores yellow-brown, smooth, and 4-5 μ in diameter.

Lister calls the color red-brown; the spores pale red, minutely warted, and from 4 to 7 μ in diameter. He finds the spores "usually with two to four purple plasmodic granules on the spore wall."

Massee adopts the name D. cernuum Nees. His description agrees essentially with the above descriptions.

In the specimens which I have I find some of the spores with the purple plasmodic granules mentioned by Lister, but I think their connection with the spores is accidental, the granules having been separated from the ribs are merely touching the surface of the spores. I find the spores by transmitted light not reddish but rather faintly yellowish, nearly colorless and smooth. The meridional ribs of this species render the determination certain.

One of my specimens from Campus woods, July 18, 1904, and another from a different part of Madison, growing upon decayed wood, are of a decided purplish tinge; another from Cemetery woods, July 9, 1904, is a light rusty-brown, showing no hint of purple, while three gathered in Vilas woods, July 16, 1904, and one at Blue Mounds, July 9, 1904, are brown with a more or less purple tint. All are upon wood except one of the Vilas woods specimens, which is partly upon a thin bark.

LYCOGALA EPIDENDRUM (BUXB.) FRIES.

1721. Lycoperdon epidendron, etc., Buxbaum, En. Pl. Hal., p. 203.

1753. Lycoperdon epidendrum Linn. Sp. Pl., p. 1184.

1794. Lycogala miniatum, Pers., Röm. N. Mag. Bot., I., p.87.

1829. Lycogala epidendrum (Buxb.) Fries, Syst. Myc.,III., p. 80.

Saccardo: Aethalia gregarious, spherical, shining, warted, at first pink, then red, at length ashen or dusky; spores and capillitium various colors, pink, purple, violet-red, at length pale, lead color or gray; spores smooth 3-5 μ diameter.

Macbride has found the aethalia solitary as well as clustered. He calls them depressed spherical or when crowded, irregular, 3-10 mm. in diameter. He finds them dehiscing irregularly, but more often near the apex. He adds: "Peridium thin, but tough and persistent, made up of numerous agglutinated tubules, enclosing in their meshes peculiar cell-like vesicles; capillitium parietal, consisting of long, branching, and anastomosing flattened tubules extended inwardly among the spores, everywhere marked by transverse wrinkles, ridges and warts, the free ends of the ultimate branchlets rounded, concolorous with the spores; * * * spores by transmitted light colorless, minutely roughened or reticulate, 5-6 μ."

Lister adopts the name L. miniatum, Pers. His description agrees with those already given excepting as to the size of the spores, which he gives as 5-7μ in diameter.

Massee finds the diameter of the capillitium thread 8-12μ, its tube soon collapsing; he finds the spores minutely but distinctly warted and from 4 to 6μ in diameter.

The above descriptions are fairly correct for my specimens. I find the capillitium to be of long, branching, anastomosing tubes from 3 to 21μ thick, wrinkled, with free ends which are clavate, spherical, or merely rounded off. The spores are minutely roughened, 6-7μ in diameter.

We have specimens from upwards of a dozen different localities in the state, including the Lake Superior region. This species seems one of the most common and most plentiful. We have it collected April 29, 1904, at Blue Mounds, evidently just grown. We have collected it in July, October, and November. We have three groups of aethalia growing upon three different species of polyporus, one upon wood charred by fire, upon cedar, oak, and poplar, both upon wood and bark, and upon moss and the decayed wood upon which the moss is growing.

LYCOGALA FLAVO-FUSCUM (EHR.) ROST.

1818. Diphtherium flavo-fuscum Ehr., Syl.Myc.Berol., p. 27.

1829. Reticularia flavo-fusca (Ehr.) Fries, Syst. Myc., III., p. 88.

1873. Lycogala flavo-fuscum (Ehr.) Rost., Versuch., p. 3.

1875. Lycogala flavo-fuscum (Ehr.) Rost., Mon., p. 288.

Saccardo: Aethalia spherical, surface opaque, smooth or indistinctly reticulate, brownish-gray; spore- and capillitium-mass brownish-gray; spores delicately minutely spinulose 3.3-5.8μ diameter, of a faint clay color.

Macbride speaks of the aethalia as solitary, or two or three together, 2-4 cm. in diameter, purplish gray or brown, smooth, shining; the peridium showing two or three layers in microscopic section; capillitium of abundantly branching, irregular, transparent tubules, marked by numberless warts and transverse rings or wrinkles; he calls the spore mass yellowish gray, the spores by transmitted light colorless, smooth or faintly reticulate or roughened, 5-6μ in diameter. He says this species is generally mistaken for a puff-ball.

Lister states that the middle layer of the peridium is an aggregation of yellow vesicles intermixed with the peripheral ends of the capillitium, the inner layer homogeneous, pierced by the capillitium threads; he gives the diameter of the threads as 6 to 20μ, or more, and speaks of

their having numerous blunt-ended free branches.

Massee gives as the diameter of the aethalia 3-9 cm. He calls the tubes of the capillitium rather scanty, 4-5μ thick, slightly rugulose or with indistinctly raised bands.

The specimens which I have are from 2-3.5 cm. in diameter, brownish-gray, surface shining, under the hand lens showing reticulations. The spores agree with Macbride's measurements, 5-6μ . I find them faintly reticulate and colorless. The capillitium is distinctive and would separate it at once from the Reticularias or Enteridiums, with which it might be confounded. The capillitium thread is very broad in places, even 45μ , in others as narrow as 6μ; it is irregular, branched, wrinkled, minutely warted, with blunt ends. It resembles the capillitium of L. epidendrum excepting in width. The color under the microscope is pale yellow. The figures given in Lister Pl. LXXV., A, are correct for the capillitium as I find it.

This species does not seem to be common; our eight specimens are from Madison, collected in September, 1901, and November 16, 1894; one group of three aethalia growing upon dead maple bark.

LYCOGALA EXIGUUM MORG.

1893. Lycogala exiguum Morg., Jour. Cin. Soc., p. 134.

Morgan: Aethalia small, globose, gregarious, the surface dark brown or blackish, minutely scaly, irregularly dehiscent. The wall thin; the vesicles with a dark polygonal outline, disposed in thin irregular reticulate patches, which are more or less confluent. The tubules appear as an interwoven fibrous stratum upon the inner membrane; they send long slender branched extremities inward among the spores. Spores in mass pale ochraceous, globose, nearly smooth, 5-6 mic. in diameter. Growing on old wood. Aethalium 2-5 mm. in diameter, the threads 2-10 mic. in thickness, with very slight thickenings of the membrane. The polygonal vesicles give a reticulate appearance to the dark-brown patches which ornament the surface of the wall.

In Macbride's description are the statements that this is found in the same situations as L. epidendrum and at the same season; that this species is recognizable by its gregarious habit, small size, and dusky color; and that the little spheres are dark lead-colored, shading to black.

Neither Massee, Lister, nor Saccardo mentions this species.

The specimen which I have agrees with the above de-

scriptions very closely. The aethalia besides being smaller than those of L. epidendrum, are of a dusky brown or nearly black color from the first. The irregular scales upon their surface, under the lens show the vesicles as having nearly regular polygonal outlines, quite different from those in the peridium of L. epidendrum. The spores are smoother and not tinted with yellow. The capillitium threads I find to be from 3 to 9 μ wide, and although preserving the general appearance of those of L. epidendrum, yet the wrinkles in these are less deep, fewer, and are irregularly placed.

We have but one specimen which was found growing upon decaying bass-wood, at Devil's Lake, July 2, 1904.

OPHIOTHECA WRIGHTII BERK. AND CURTIS.

1868. Ophiotheca wrightii B. and C. Jour. Linn. Soc., X., p. 349.

1876. Cornuvia wrightii (B. and C.) Rost. Mon. App., p. 36.

1892. Cornuvia wrightii (B. and C.) Macbr., Bull. Lab. Nat. Hist. Ia., II., p. 122.

Macbride: Plasmodiocarp bent or short-flexuous, often arcuate or completely annular, dark chestnut brown or black, opening irregularly; peridium thin, brittle, translucent, covered without by a rather dense layer of brownish or black brown scales; capillitium of long, sparingly branched threads furnished with projecting spinules remarkable for their length, about twice the diameter of the thread; spores yellow, minutely but distinctly warted, about 12μ. It is readily distinguished at sight by the peculiar annular, looped, and U-shaped plasmodiocarps, with their dark umbrine or blackened surface.

Saccardo adopts Berkeley and Cooke's name, Cornuvia wrightii. He gives the diameter of the spores as 10.8-12.5μ, capillitium threads as 2.5-3.3μ thick, and spines on the thread as 1.7-3μ long.

Massee says the sporangia dehisce in a circumscissile manner. He describes the threads of the capillitium as densely and very minutely verruculose, in addition to the numerous spines, which he finds to be 2-4μ long. The diam-

eter of the spores he gives as 10-14 μ .

Lister puts the species into the genus Perichaena, and names it P. chrysosperma. His description leaves no doubt that it is the same species as described by Macbride as above. He says however that the sporangium-wall is of two layers, the outer composed of brown granular matter, which either forms a complete crust, or is more or less obsolete; the inner layer is subcartilaginous, yellowish-olive, translucent. Stalk, when present, stout, black.

My one specimen consists of eight sporanges, one of which is a thick ring, another is about two-thirds of a ring, one is dumb-bell-shape, two are nearly spherical, and the other three are too much broken to distinguish their shape.

They have a thin, dull, dark membrane on the outside, broken away in places, showing a shining yellow inner membrane; capillitium irregular, branched, 3-5 μ thick, with scattered, slender, bent, curved, or twisted spines, 3-5μ long; free ends few, clavate, spinescent; spores yellow, warted, 9-12μ . The long spines on the thread are very distinctive.

I found this species upon the bark of a knot upon a small dead oak twig which had a few hours before been blown from the tree to a walk on the U. W. campus. The sporangia must have formed while the twig was still high above the ground; an unusual position for a myxomycete.

PERICHAENA DEPRESSA LIBERT.

1837. Perichaena depress Lib., Fl. Crypt. Ard., IV., No.378.

Saccardo: Peridia very much depressed, gregarious, crowded, polygonal, united laterally, red- to chestnut-brown, shining, top coming off like a lid; capillitium well developed, threads of various forms and thickness 8 to 33μ; spores globose, smooth, 9-11μ in diameter.

Macbride says the capillitium is of slender yellow threads of various widths, almost smooth; spores minutely warted 10-12μ in diameter; shallow spore-cases in which lie the yellow spores and scanty capillitium.

Lister speaks of this species as having a sporangium-wall of two layers, the outer cartilaginous charged with brown granular matter, more or less closely combined with the membranous, smooth inner layer. He calls the spores minutely warted, 8-12μ in diameter.

Massee calls the capillitium threads smooth, rarely notched or furnished with rudimentary scattered spinules; spores minutely warted 9-12μ in diameter.

In my material the capillitium is not very abundant, varying in width, with irregular projections, branched; spores minutely warted, 9-12μ.

My one small group of sporangia I found on a piece of oak bark in the Campus woods in October, 1903.

PERICHAENA CORTICALIS (BATSCH) ROST.

1783. Lycoperdon Corticale Batsch, Elench. Fung., p. 155.
1817. Perichaena populina Fries, Symb. Gast., p. 12.
1875. Perichaena corticalis Batsch Rost., Mon., p. 293.

Saccardo: Peridia gregarious, sessile, resting upon a hypothallus, spheroidal, depressed, dehiscence circumscissile; from dirty yellow to obscure red; capillitium scantily developed, threads 8-25μ thick; spores smooth, light yellow, 10-12μ.

Macbride calls the upper part, or lid, chestnut brown, the lower almost black; capillitium smooth, attached to the lid and usually coming away with it. * * * On and under the bark of dead elms of various species. * * * Prior to maturity the future line of fission is plainly indicated by the difference in color. In another place he says the capillitium is nearly smooth; spores only slightly roughened by minute warts.

Lister adopts the name given by Fries, P. populina. He says the sporangia sometimes form short broad plasmodiocarps; that they are crowded, sessile on a broad or narrow base, rarely substipitate. He calls the color dark purple or purplish-brown, nut-brown, gray, or white. "Dehiscing along definite lines, either horizontally with a convex lid, or in broad sinuous lobes. He calls the capillitium threads

irregularly compressed, angled and constricted, minutely warted, rarely smooth." Size of the spores 12 to 14μ in diameter.

Massee describes the color as brown, bluish-purple, sometimes whitish; capillitium sometimes almost obsolete, threads thin smooth, or here and there notched; spores warted, warts variable in size, sometimes very indistinct, at others well developed, never smooth, 9-12μ diameter. The spores varying in marking from vague granulations to well defined warts.

My material shows that the sporangia are gregarious, sessile or substipitate, globose, ellipsoid, sometimes umbilicate below, or forming short plasmodiocarps, but none are flattened; dehiscence circumscissile by a convex lid with sinuous lobes, as Lister states; the color medium or dark brown, sometimes with a purplish tinge; sometimes but not always showing in lighter color the line of dehiscence; there are no such differences of color between the cap and cup in my specimens as Macbride mentions; thin, shining extended hypothallus. Macbride states that the capillitium is smooth, then he says nearly smooth, yet he gives in his figures the capillitium represented as angled, notched, and with projections. I find the capillitium scanty or almost wanting, branched, unequal, yet none as wide as Saccardo gives, never smooth, but angled, constricted with projec-

tions but no minute warts; capillitium and spore-mass yellow; spores minutely warted, 10-12μ .

I obtained this species in large quantities October 19, 1903, from all parts of the bark of a poplar log in the Elmside woods. I found none upon the wood itself. April 29, 1904, the log had been removed, but a few rods away was a piece of poplar bark bearing several groups of the species, of the last year's fruit. With these was a group nearly white, wrinkled and shriveled; these put into a warm moist-chamber became plump and came to maturity. I think that they had started to grow one unusually warm April day and the succeeding cold had arrested their development.

Some pieces of the bark brought into the Herbarium Room in October and in April put under a bell-jar on a tin plate and kept moist, fruited plentifully, giving me material for the study of their life-history. The plasmodium appears on the surface only as tiny milky white drops which are the beginnings of the sporangia. From the first appearance to the fully ripe spores does not ordinarily take over thirty-six hours.

We have no other specimens except those from Elmside.

LACHNOBOLUS OCCIDENTALIS MACBR.

1885. Lachnobolus incarnatus (Alb. and Schw.) Macbr., Bull. Lab. Nat. Hist. Iowa, II., p. 126.

Macbride: Sporangia scattered or crowded upon a hypothallus more or less distinct, globose or ellipsoidal, short-stipitate, varying somewhat in color, at first rosy or flesh-colored, later brownish or ochraceous; the peridium exceedingly thin, pellucid, meally, evanescent above, persisting as a shallow cup below, capillitium inelastic, rather closely netted of threads variable in thickness, marked by frequent thickenings or expansions, everywhere warted, attached to the peridial wall; spores in mass flesh-colored, under the lens colorless, smooth, globose, 7.5-9μ. When newly formed the sporangia have a peculiar rosy or flesh-colored metallic tint, which is all their own. Within a short time this color passes, and most of the material comes from the field brownish or ochraceous in color. Typical sporangia are spherical on distinct short stipes. The capillitium never expands as in Arcyria.

Saccardo follows Schroeter in calling this form L. incarnatus (Alb. and Schw.) Schroet. He makes the diameter of some of the nodes 10μ, the thread 3-5μ thick, and the spores 6.5-7.5μ in diameter.

My two specimens have about the same habit of growth and same size of sporangia as Trichia persimilis, T. scabra,

and T. Favoginea. From the color when old, this species might be mistaken for T. persimilis. The sporangia are sometimes pear-shape with the small end up. There is a thin, papery hypothallus. The most distinctive feature of general appearance is the non-elastic capillitium mass, and its gradual disappearance as the peridium wears away, leaving the tops of the sporangia, with their capillitium and spore-mass always clean-cut and level. The capillitium thread is very unequal in width, with frequent enlarged nodes, and with small and large loops and rings formed in the thread. The spores are smooth, colorless, 6-9μ in diameter.

One specimen was found at Lake Mills, November, 1901, the other I found in Cemetery woods, October 29, 1903, both growing upon dead poplar wood.

ARCYRIA NUTANS (BULL.) GREV.

1791. Trichia nutans Bulliard, Champ., p. 122, t. 502, III.
1794. Arccyria flava Pers., Römer N. Mag. Bot., I., p. 90.
1824. Arcyria nutans Grev., Fl. Edin., p. 455.

Saccardo: Peridia clustered, evanescent, short stiped, cylindrical; spores and capillitium dull whitish-yellow; capillitium expanded, long, curved, at length decumbent; threads attached to the tube of the stipe, 3-4μ thick, bearing stout spines irregularly; spores smooth, 7-8μ .

Macbride calls the sporangia pale yellow or buff, and speaks of there being forms that are sessile by an acute base. The base alone of the peridium persists, and that is a shallow, colorless, often inwardly spinulose, plicatulate calyculus. He says the hypothallus is thin, but usually in evidence. The capillitium, besides the spines, has sharp-edged transverse plates, sometimes rings, the surface especially marked by an indistinct reticulation, all of which characteristics I have noticed in my specimens. He says also that the capillitium is very lightly attached, and that the spores are colorless.

Lister adopts the name A. flava Pers. He names about the same characteristics as given above, but adds: "Stalk short, or elongated and weak, filled with spore-like cells, buff; free ends more or less numerous, with clavate tips."

Massee adopts the name A. mutans, Rost. His description agrees with those given above.

I find the descriptions given above accurate for my specimens. The long soft plumose ochraceous capillitium mass makes this species easy to distinguish.

Our two specimens were obtained, one near Wausau in the summer of 1894, growing upon bark, the other upon poplar wood across the St. Louis river from Fond du Lac, July 30, 1897.

ARCYRIA INCARNATA PERSOON.

1786. Clathrus adnatus Batsch, Eleuch. Fung., 141. (?)

1791. Arcyria incarnata Pers., Gmel.,Sys.Nat.,II.,p.1467.

Macbride: Sporangia closely crowded, cylindric, 1-15 mm. high, rosy or flesh-colored, stipitate or almost sessile; stipe generally short, sometimes barely a conical point beneath the calyculus; hypothallus none; peridium wholly evanescent except the shallow, saucer-like, inwardly roughened calyculus; capillitium loose, broad, pale reddish, attached to the cup at the center only, by strands which enter the hollow stem, the threads adorned with transverse plates, cogs, ridges, etc., arranged in an open spiral; spore-mass rosy, spores by transmitted light colorless, nearly smooth, 7-8μ. This common species is well marked, both by its color and by the delicate attachment of the capillitium to the calyculus. This is so frail that the slightest breath ofttimes suffices to effect a separation, and the empty calyculi are not infrequently the only evidence of the fructification.

Lister says that the cup of the sporangium-wall is membranous, even or interruptedly plicate, and spinulose. He finds in the capillitium here and there broad perforated or ring-like expansions, and the thread often swollen at the axils of the branches. He finds free ends present more or

less numerous, clavate or pointed, spinose. He, also, speaks of the capillitium as being without attachment to the cup, and that it is more diffusely expanded than that of T. punicea.

Massee, as well as the others quoted, describes the capillitium as "having very few attachments to the basal portion of the thin sporangial wall."

This species I distinguish from A. punicea by the slight attachment of the capillitium to the calyculus, the greater expansion of the capillitium mass, and by the much shorter stipe. I find few free ends, one specimen showing none at all, though large and small rings are numerous and there are some swellings along the thread. Another specimen shows several free ends. In general, Macbride's description is accurate for my specimens.

We have specimens from Brulé river, July 19, 1897, growing upon moss, and upon Norway pine bark; from Lake Mills on Poplar wood, gathered November, 1901; from Cemetery woods and other parts of Madison in October, 1903, and upon a poplar log in our Science Hall greenhouse in October, 1903.

ARCYRIA PUNICEA PERS.

1753. Clathrus denudatus Linn., Syst. Nat., p. 1179.
1794. Arcyria punicea Pers., Röm. N. Mag. Bot., I., p. 90.
1895. Arcyria denudata (Linn.) Sheld., Minn. Bot. Studies No. 9, p. 470.

Macbride adopts the name A. denudata (Linn.) Sheld. Sporangia crowded or gregarious, ovoid or short cylindrical, tapering upward, red-brown, stipitate; peridium evanescent except the plicate calyculus; stipe about equal to the expanded capillitium, concolorous, plicate or striate, ascending from a small hypothallus; capillitium attached to the whole inner surface of the calyculus, and connate with it, hence not deciduous, bright red or carmine when fresh, turning brown or paler with age, the threads even, about 3μ, adorned with a series of rather distant cogs or half rings, which form around the thread a lengthened spiral; spore-mass red or reddish-brown, spores by transmitted light colorless, nearly smooth, 6-8μ. This species is easily distinguished from all others of similar tints by the attachment of the capillitium. In adornment of the threads it is like A. incarnata.

Saccardo says that the color of all parts of this species varies from saffron to purplish, and to brick-red.

Lister calls the color of the sporangia crimson. He says the stalk is filled with spore-like cells. He describes the capillitium as an elastic network of flattened or terete red threads, with many attachments to the cup, and usually without free ends.

Massee calls the color vermilion, sometimes with a brownish or purple tinge, rarely yellowish-brown. He also speaks of the attachment of the capillitium to the sporangial wall.

My specimens do not vary from the above descriptions. The chief differences between this species and A. incarnata is the longer, more twisted and plicate stipe, and the less expanded capillitium with its permanent attachment to the calyculus. The capillitium of my specimen from Cemetery woods is 5-6 μ thick, while that of the other specimens is about 3 μ. One of my three specimens was found near Doherty lake in the summer of 1893, growing upon green moss and much decayed wood; one very small specimen growing upon wood I found in Cemetery woods October 27, 1903. For the third I have not the exact locality or date. It is upon the end of a knot of poplar, with many sporanges of a Dictydium commingled with it.

ARCYRIA CINEREA (BULL.) PERS.

1791. Trichia cinerea Bull., Champ.de France,p.120,Tab.477, Fig. iii.,

1801. Arcyria cinerea (Bull.) Pers. Syn. Fung., p. 184.

Macbride: Sporangia scattered or gregarious, ovoid or cylindrical, generally tapering upward, about 2-3 mm. high, ashen gray, sometimes with a yellowish tinge, stipitate; calyculus very small, thin; stipe about half the total height, rising from a small hypothallus, thin, gray or blackish, densely crowded with spore-like cells; capillitium dense, freely branching, ashen, or yellowish, little expanded in dehiscence, the threads almost even, though a little wider below, minutely spinulose; spore-mass concolorous, spores by transmitted light colorless, smooth, 6-7 A very common little species easily recognized by its color and habit. The capillitium is more dense than in any other species and expands less. The stipe is about equal to the expanded capillitium, unusually long.

Lister adopts the name A. albida Pers. for a species which seems to be the same as this one, although Macbride does not give A. albida as a synonym. Lister gives as a synonym for A. albida, Trichia cinerea Bull. However, his description agrees with Macbride's as given above.

Massee gives this species the name Arcyria cinerea,

Mass. He says that the sporangia are simple or digitato-fasciculate on a common stem; that the capillitium is dense, protruding elastically, and remaining erect. The rest of his description agrees with Macbride's.

My specimen agrees with Macbride's description excepting as to spores, which I find to be from 7 to 9μ in diameter. The sporanges are tiny bodies, under a hand lens showing beautiful dense pear-shaped masses of soft gray capilllitium with a yellowish tinge, which keep their shape and erectness under many adverse conditions.

The one small group of this species which I have, was found at Blue Mounds August 8, 1903. The sporangia were growing upon wood so much weather-worn that it fell into fragments.

HEMIARCYRIA SERPULA (SCOP.) ROST.

1772. Mucor serpula Scop., Fl. Carn., II., p. 493.
1794. Trichia serpula (Scop.) Pers., Rom.N.Bot.Mag.,I.,p.90.
1873. Hemitrichia serpula (Scop.) Rost., Versuch, P. 14.
1875. Hemiarcyria serpula (Scop.) Rost., Mon., p. 266.
1892. Arcyria serpula Mass. Mon. p. 164.

Saccardo: Peridia spreading, vein-like, with many abruptly reticulated branchings; capillitium 4 μ, branches numerous, free ends, the ends equal to the diameter of the capillitium, or somewhat longer; spiral bands 3-4, smooth, armed with numerous long spines, spaces between bands 3 or 4 times the width of the bands; spores yellow 9-11 μ.

Macbride adopts the name Hemitrichia serpula (Scop.) Rost. He says in part: Fructification plasmodiocarpus, often covering several square centimeters in extent, terete, rusty, tawny, or bright yellow; the peridium thin transparent, with irregular dehiscence; hypothallus none; capillitium variable, sparingly branched, free everywhere, the free tips spinose, acuminate * * * traces of longitudinal striae; spore-mass golden yellow, spores globose, delicately reticulate, about 10 μ in diameter.

Lister also adopts the name Hemitrichia serpula, (Scop.) Rost. He says the sporangium-wall is of two layers; capillitium threads are 5 to 6 μ thick; spores 10 to

12μ in diameter, their border being from .5 to 1μ wide.

Massee makes this species Arcyria serpula. His description does not differ materially from the others. He speaks of a form collected in Cuba, which was subglobose, scattered, and sessile on a broad base.

The specimens which I have show the same structure and habits of growth as already described. I find the sparingly branched capillitium threads 5 to 6μ thick, some free ends which are acuminate, spinose; spores reticulate with narrow bands 9-12μ.

We have two specimens, both from Blue Mounds, growing upon much decayed wood and bark, collected August 18, 1902, and April 29, 1904, the latter evidently the fruit of the previous year.

HEMIARCYRIA RUBIFORMIS (PERS.) ROST.

1786. Lycoperdon vesparium Batsch, Eleuch. Fung., pp. 255-6, Fig. 172.

1794. Trichia rubiformis Pers., Röm. N. Bot. Mag., I., p.88.

1875. Hemiarcyria rubiformis (Pers.) Rost., Mon., p. 262.

1899. Hemitrichia vesparium (Batsch) Macbr.,N.-A.S.-M.p.203.

Saccardo: Sporangia fascicled, with short connate stipes, cylindrical-turbinate, with a metallic lustre, dark red; spores and capillitium cinnamon- or ruby-red; capillitium threads 4-5μ thick, rarely branched, free ends acute smooth, or inflated and ending with a short spine, rarely obtuse; spiral bands 2-4, armed with numerous spinules, the spaces between twice the width of the bands; spores smooth, 10-11μ in diameter.

Macbride gives this species the name Hemitrichia vesparium (Batsch) Macbr. I quote a part of his description: "Sporangia rarely single, clavate or subcylindric, stipitate or sessile, dark wine-red or red-black; stipes solid, concolorous; capillitium marked by three or four spiral ridges; spores by transmitted light reddish orange, very distinctly warted, subglobose, 10 to 12μ. A most common species on rotten wood, everywhere, especially in forests. Recognized generally at sight by its color and fasciculate habit. The peridium shows a tendency, often, to circum-

scissile dehiscence, and persists long after the contents have been dissipated, in this condition suggesting the name applied by Batsch, vesparium, wasp-nest. Rostafinski describes the spores as smooth; they seem to be uniformly distinctly warted. The plasmodium is deep red and a plasmodiocarpus fructification occasionally appears."

Massee gives this species the name Arcyria rubiformis, Mass. He speaks of the capillitium mass as elongating at maturity and carrying the apical portion of the sporangium at its apex, where it remains in the form of a cap. I think this characteristic is not universal in this species. He says the capillitium tips are usually terminated by from one to three short, smooth spines. This too I find not common. He says the spores vary from almost perfectly smooth to minutely but distinctly warted.

Lister gives this species the name Hemitrichia rubiformis, Lister. He gives the length of the capillitium spines as 2-5μ. He says the capillitium is rarely nearly smooth, and that sporangia are occasionally found with a few free elaters pointed at each end, in addition to the continuous network of threads of the usual type.

I find no essential points in which my specimens differ from the above descriptions. I have failed to find plasmodiocarpus forms. The spores are distinctly warted, from 9-12μ in diameter.

This species is very common here. It was found in great abundance late in October, 1903, in Cemetery woods, in Vilas woods, and in the University campus woods. We have specimens also from Blue Mounds, collected October 4, 1902. A few collected at Blue Mounds April 14, 1904, were evidently the fruit of the previous year.

HEMIARCYRIA STIPATA (SCHW.) ROST.

1834. Leangium stipatum Schw., N.A.F., p.258, No. 2304.
1876. Hemiarcyria stipata (Schw.) Rost.,Mon.App.,pp.41, 42.
1894. Arcyria stipata (Schw.) Lister Mon. Mycetozoa, p.189.
1899. Hemitrichia stipata (Schw.) Macbr. N.-A. S.-M., p.204.

Macbride and Lister only of the four authorities which I have before quoted mention this species.

Macbride calls this species Hemitrichia stipata (Schw.) Macbr.: "Sporangia distinct, crowded, cylindric or irregular, overlying one another, rich copper-colored, metallic, shining, becoming brown, stipitate; the peridium thin, the upper portion early evanescent, the base persistent as a cup, as in Arcyria; capillitium concolorous, the thread abundantly branched to form a loose net, with many free and bulbous ends, pale under the lens, marked by three or four somewhat obscure spiral bands, and a few wart-like, or plate-like thickenings; stipe very short; spore-mass reddish, spores by transmitted light pale, nearly or quite smooth, 6-8μ. This species is known at sight by its peculiar beautiful tint, when fresh, as by the crowded prolix habit of the singular overlying sporangia. * * * It is a boundary form unquestionably."

From Lister I add the following: "Copper-colored or deep brown with a carmine tinge; membranous hypothallus;

capillitium marked with a border of broad-based spines, or blunt cogs, sometimes covered with minute spines in addition; with many free clavate ends."

For the three groups of sporangia which I have, Macbride's description of manner of growth and general characteristics is accurate. The capillitium illustrated on his "Plate I.," is, however, entirely different from that which I find. In Lister's Mycetozoa, Plate LXX., A, figs. f. and b. are like what I find. The capillitium has a border of broad-based spines, turning from one side to the other of the thread. The free ends are very few, but they all terminate with large globular swellings from 13-18μ in diameter. These same globose enlargements are occasionally found along the course of the thread, which is 3-4μ thick; there are no loops or rings in the thread. I find no difference in threads taken from different parts of the capillitium mass.

My three specimens were collected in Cemetery and Vilas woods in October, 1903. They are upon both wood and bark of decayed poplar.

HEMIARCYRIA CLAVATA (PERS.) ROST.

1794. Trichia clavata Pers., Röm. N. Bot. Mag., I., p. 90.
1873. Hemitrichia clavata Pers., Rost., Versuch, p. 14.
1875. Hemiarcyria clavata (Pers.) Rost., Mon., p. 264.
1893. Hemiarcyria ablata Morgan, Jour. Cin. Soc., p. 30.
1893. Hemiarcyria funalis Morgan, Jour. Cin. Soc., p. 32.
1892. Arcyria clavata Mass., Mon., p. 165.

Saccardo: Sporangia simple, gregarious, stipitate, more or less clavate, yellow, shining; stipe rather long, attenuate below, wrinkled; concolorous or with the base reddish; spores and capillitium yellow or olive, or dusky yellow; capillitium 4 μ thick, sparingly branched, with free ends obtuse or frequently slightly enlarged; spiral bands 5, slender, spaces between two or three times the width of the bands; spores warted, 8-9μ in diameter.

Macbride adopts the name Hemitrichia clavata, Pers., Rost. He describes the sporangia as clavate or turbinate, color yellow, olivaceous or brownish; peridium generally thin, evanescent above, breaking away so as to leave a more or less definite cup beneath; stipe about one-half the total height, reddish, reddish-brown, or blackish, hollow about half-way down; spirals on the capillitium four or five, regular, even, and projecting sharply; capillitium variable in the number of free ends, degree of smoothness, and amount

of branching. Spores pale yellow, minutely but distinctly warted, 8-9μ in diameter.

Lister adopts the name Hemitrichia clavata, Rost. He describes the plasmodium as watery white in dead wood. Total height 1 to 3 mm.; sporangia rarely globose; sporangium-wall minutely papillose on the inner side; capillitium 5-6 in diameter, with 5-6 spiral bands 1μ wide with intervals of 1 to 1.5μ, sometimes spinose in parts in imperfect developments; spores 8-10μ in diameter.

Massee names this species an arcyria. He describes the stem as filled with large, globose, or subangular cells which pass upward into normal spores; he calls the capillitium 4 to 5μ thick; spores reticulated 8-10μ, but, he says, the ridges are sometimes short and distinct or even wart-like.

The many specimens which we have vary from light yellow, shining, to brownish, dull; some forms nearly sessile, while with others the stipe is more than half the total height. The long-stiped forms are clavate or turbinate, the short-stiped ones more nearly globose. The capillitium is centrally attached to the cup, and when set free by the evanescence of the upper part of the peridium it usually hangs from the cup in a long ragged mass. In such cases the cup is quite deep and the edge irregular. But I have several forms gathered at different times and places,

which have short stipes and in which the peridium breaks away at the top, the lower part becomes distinctly reflexed and leaves a small shallow cup upon which the capillitium-mass remains quite permanently as a little globose mass. The capillitium and spores of these specimens show no variations from the other specimens. The capillitium is 6-7 μ wide, with four or five spirals, smooth, even; the spores are minutely warted.

In April and May of this year, 1904, many of this species have appeared in our Science Hall greenhouse, upon decaying logs, mostly oak and poplar, which were brought in last fall. These forms have unusually long stipes and the sporangia are rather smaller than the average. The plasmodium is within the wood and is watery white; it begins to pile up in milky white drops as soon as it comes to the surface. Then it elongates upward, the top at once becoming larger than the bottom. Its typical form is shown early. The sporange does not get its normal size till quite a while after the stipe has its full length. It is still milky white. In about thirty-six hours after its first appearance the stipe begins to turn reddish inside—the outside is translucent. In about forty-eight hours the whole body is dark red-brown; then it turns light yellow, the top turning first; the top then breaks away in fragments. The process is hastened by an increase of temperature.

These specimens in the greenhouse show the reflexed peridium and globose ~~capilliticum~~ *A. crangiorum* such as I have described above. Lister pictures such a fruit in Plate LXXIV. of his Mycetozoa, and says it is a United States specimen.

Our specimens are from Dead lake, Cemetery woods, Vilas woods, and U. W. woods, Madison; from opposite Fond du Lac, gathered July, 1897, and from Blue Mounds. The most were gathered late in the fall, one lot in May. A few are upon bark but the majority are upon decayed poplar wood.

TRICHIA VARIA (PERS.) ROST.

1791. Stemonitis varia (Pers.) Gmel., Syst.Nat.,II.,p.1470.
1829. Trichia varia (Pers.) Fries, Syst.Myc.,III.,p.188.
1875. Trichia varia (Pers.) Rost., Mon., p. 251.

Saccardo: Peridia sessile, globose, but the mass having an irregular surface, there often being some reniform sporanges intermixed; yellow, approaching brownish or reddish yellow, scattered or crowded; elaters cylindric, with a thin membrane, towards the ends regular or slightly enlarged, slightly curved, the ends 2-3 times as long as the diameter of the elater; spiral bands 2, spaces between 3 or 4 times as wide as the band; spores warted, dull yellow 10-14μ.

Macbride says of the sporangia that they are shining, sessile, or with short black stipe; hypothallus none. He says that the capillitium is of rather long, simple, or more rarely branched elaters, 4-5μ wide. He finds two spiral bands, prominent and narrow and in places remote, the apices acute. The spore-mass he calls yellow, the spores 12-14μ in diameter, delicately verruculose, guttulate. He calls this a common species, variable in form. "The two spiral bands are loose and irregular, unlike anything else in the group except the same structure in T. ontorta, but here the elater is narrow and the sculpture obscure."

Lister speaks of the sporangia as sometimes forming short plasmodiocarps, and speaks of the wall as membranous, pale yellow, marked with ring-shaped or crescentic thickenings. He gives the diameter of the spores as 11-16μ .

Massee describes the spores as turbinate or subglobose, the elaters as rarely branched, and sometimes swollen at the commencement of the tapering tips.

The abundant material which I have varies from crowded to scattered, from short-stipitate to sessile forms, from dark orange to shining bronze-brown, from globose to plasmodiocarpus forms, and varies considerably in size even in the same group. One of my groups has a distinct hypothallus. The elaters are generally simple, sometimes branched, 3 to 5μ thick, the spirals smooth, 2 or 3, projecting boldly, continuing to near the end of the tip. With but one or two exceptions all the elaters I have seen have been swollen just at the beginning of the apex, generally on one side, giving the end a bent or unsymmetrical appearance at once noticeable and determinative. The tip is curved, often twisted like a corkscrew. The spores I find to be globose, delicately warted, 12-16μ .

Many specimens I found in Cemetery woods late in October, 1903. Some were found in Vilas woods and in the Campus woods in 1903, and in two other localities in Madison in 1899. They were mostly upon dead poplar wood and bark.

TRICHIA SCABRA ROST.

1875. Trichia scabra Rost., Mon., p. 258.

Saccardo: Typical sporangia gregarious, sessile on a common membranous hypothallus; elaters cylindrical, apices acute, straight, or slightly curved; spiral bands 3-4, bearing numerous short, acute spines; spaces between, wide, smooth; spores 8-11μ ; epispore thick, with numerous obtuse warts.

Macbride: Sporangia closely crowded, regular, globose or turbinate-globose, orange or golden brown, smooth, shining; capillitial mass clear golden yellow, or sometimes rusty orange, the elaters simple, long, 4-5μ in width, spirals closely wound, even and regular; spore-mass concolorous, under the lens spores yellow, covered by a delicate fine-meshed network, or simply spinulose under low power, 10-12μ . Fructifications two inches or more in length and half as wide are not infrequent on the lower side of fallen stems in forests of deciduous trees.

Lister varies but little from the above. He says the elaters are 4-6μ thick, with four or five bands arranged in somewhat irregular spirals, with spines, or nearly smooth, the ends acutely conical or with the bands produced at the apex in more or less diverging points, longitudinal striae rarely evident. He finds the spores minutely reticulated

* * * or irregularly warted, the spore border being reduced to a spinulose margin 9-12μ wide.

Massee says the color varies from pale yellow through dirty orange to brown. He finds the elaters to be 6-8μ thick, and that the spores have a fine network of raised lines.

My specimens might easily be mistaken from their general appearance for some of the T. persimilis specimens. The color of the most of the T. scabra however approaches nearer to orange than does T. persimilis. The manner of growth, closely crowded in circular patches, is similar to that of T. persimilis, T. favoginea, and even of some of our specimens of T. varia. Under the lens the distinction between this species and the others named is quite marked. The elaters are generally long, but in one group I find many which are quite short. They are 4-6μ wide, the apices short, acuminate, or with one or two spines divergent. The spiral bands are 3-4, spinulose, closely, sometimes irregularly wound. The spores are globose, regular, with fine reticulations, 10-12μ in diameter. In one of my specimens the capillitium hangs in a woolly mass above the empty calyculi, as described by Macbride for T. favoginea.

We have specimens gathered at five different times in October, 1903, three from Cemetery woods, and two from Blue

Mounds. One specimen from Blue Mounds in April, 1904, was evidently the fruit of the year before. All were growing upon dead bark.

TRICHIA PERSIMILIS KARST.

1868. Trichia persimilis Karst., Not. Saellsk. Fenn. Fork., IX., p. 353.

1869. Trichia affinis De Bary, Fuckel. Sym. Myc., p. 336.

1875. Trichia jackii Rost., Mon., p. 258.

1878. Trichia proximella Karst., Myc. Fenn., IV., p. 139.

Saccardo: Sporangia aggregated, nearly or quite spherical, brownish, with a bronze-lustre, sessile; elaters cylindric, yellow, 4-6μ, apices smooth, generally curved, twice as long as the diameter of the elater; spiral bands 3-4, prominent, spaces between twice the width of the bands; bands armed with scanty, prominent, curved, hyaline spines, 8-10μ long, 4-6μ thick; spores warted, yellowish, globose, 12-14μ.

Macbride says in part: The sporangia are golden yellow to tawny, anon iridescent with metallic lustre; hypothallus thin, but usually very distinct; capillitial mass ochraceous or tawny yellow, the elaters long, even, about 4μ wide, the spirals four, more or less spinulose, generally joined by longitudinal ridges, the apices short, tapering regularly, anon bifurcate; spore-mass concolorous, spores marked by an irregular or fragmentary banded reticulation, the bands broad, flat, and pitted, 10-12μ. Plasmodium said to be white. * * * "It never shows at maturity the brilli-

ant golden yellow fluff that hangs in masses about the open and empty peridia of T. favoginea."

Lister calls the elaters 4-6μ thick, with the bands sometimes produced at the apex into two or three diverging points, longitudinal striae inconspicuous. He finds the spores to be 11 to 14μ in diameter, with the reticulation broken, or represented by irregular pitted warts, border interrupted. He says also: "The occurrence of the long spinous processes on the elaters, noted in the original description of T. persimilis, is not a constant character."

Massee adopts the name, T. affinis, De Bary. His description is scanty and does not differ from the above excepting where he says this species is distinguished by the presence of pits on the raised bands of the epispore, and the absence of raised ridges running parallel to the long axis of the elater.

I found considerable difficulty at first in distinguishing this species from T. favoginea, from the descriptions as given above. The color is not markedly different from T. favoginea nor from T. scabra; the manner of growth is the same; the color varies from dark golden to light yellowish brown, generally iridescent, shining; sporanges opening by jagged cracks on top; the statement that "it never shows at maturity the brilliant golden yellow fluff that hangs in masses about the open and empty peridia of

T. favoginea," is somewhat misleading, for in a large percentage of the specimens the most noticeable feature is the woolly fluff, and the empty peridia under or around the margins of it. After a short exposure to air, light, and dust, the difference in the shade of yellow of the two species is scarcely distinguishable. Then again the description of the spores of T. favoginea in Macbride as being "in form irregularly globose" and no mention of irregularity in spores of T. persimilis, caused difficulty. Under a low-power lens the spores of T. persimilis show such an irregularity that one might easily think them to be dried, or shrunken, or otherwise distorted. The oil-immersion lens shows the bands which cause the irregularity, to be fragmentary, unequal in width, pitted, giving a much interrupted margin to the spores, which I find to be 10-12μ in diameter. The capillitium is 4-5μ wide, never as wide as 6μ, excepting in specimens gathered in Port Wing July 12, in which the capillitium is 7-8μ thick; none of the spores of this specimen were as small as 10μ; the longitudinal striae were also evident in this specimen. In the other specimens which I have, the striae are quite inconspicuous; I found spines on all the capillitium, though more abundant on some than on others; the ends of the elaters often with 2-3 spines, the end sometimes enlarged.

This species seems quite abundant in this locality.

We have specimens from Cemetery and Vilas woods, from Elmside, from Blue Mounds, and Port Wing. One group an inch and a half long and three quarters as wide, is growing upon weather-worn bits of wood almost as fine as sawdust, which are lying upon a piece of dead leaf. Other specimens are upon decayed wood, mostly poplar, or upon the inside or outside of bark. All our specimens excepting the one from Port Wing were collected in October.

TRICHIA FAVOGINEA (BATSCH) PERS.

1786. Lycoperdon favogineum Batsch, Eleuch. Fung., p. 257, Fig. 173, a, b.

1791. Sphaerocarpus chrysospermus Bull. Champ. de Fr., Tab. 417, Fig. 4.

1794. Trichia favoginea (Batsch) Pers., Röm. N. Mag. Bot., I., p. 90.

1875. Trichia chrysosperma (Bull.) Rost., Mon., p. 255.

Macbride: Sporangia closely crowded, cylindric or prismatic by mutual pressure, obovoid, sessile, olivaceous yellow, smooth and shining; the peridium thin, opening above somewhat stellately, persistent; capillitium golden yellow, escaping entirely from the peridia, and forming large woolly masses above them, the threads long, even, beautifully sculptured, bearing spirals about 4, usually smooth and connected by light longitudinal ridges, the apices short tapering, about equal to the width of the elater, 6-7 μ ; spores concolorous, by transmitted light paler, but still bright yellow, the epispore net conspicuous, the bands narrow and high, not pitted nor fragmentary, in form irregularly globose, 12-14 μ . Plasmodium yellow. A common and beautiful species recognizable at sight, after the peridia break, by the aggregate capillitium constantly in evidence above the abandoned vasiform peridia.

Lister calls the capillitium and spore-mass orange yellow and the sporangium-wall membranous, minutely thick-

ened with irregular striae. He says a stalk is rarely present. He finds the elaters to be 7-8μ thick, smooth or with scattered spines, and the points of the elaters 3-8μ long. The spore diameter he gives as 13-15μ, including the border of 1.6 to 2μ wide. He further says: "Between T. affinis and T. persimilis, and between T. persimilis and T. scabra, intermediate forms frequently occur where it is often difficult to decide under which head to place them."

Massee adopts the name T. chrysosperma, Rost. He calls the color yellow or ochraceous cinnamon. He finds sometimes a few scattered spinules on the elaters. He terms this, "A rare species characterized by the deep narrow ridges forming a network on the epispore and the surface of the bands not being punctate, and by the narrow raised lines running parallel to the long axis of the elaters."

Saccardo adopts the name T. chrysosperma (Bull.) De C. He gives the spore diameter as 10μ, or including projections 12-15μ.

The specimens which we have show the same small, densely crowded sessile sporangia as T. persimilis and T. scabra. The color is yellow, rather lighter and somewhat nearer orange than the majority of the T. persimilis. The capillitium-mass escapes from the peridia, forming a woolly mass

above. So far the description is not distinctive. But I find the capillitium smooth, or with a few scattered, very minute spinules, 6 to 8μ thick, with the ends 6μ long. There are 4 spirals closely wound. The spores are more regular in outline than those of T. persimilis, the border is 1-2μ wide, not interrupted. The bands are reticulated, more even and narrower than in T. persimilis, and are neither pitted nor fragmentary, and the spores are larger, being 12-15μ in diameter.

The smoother capillitium, the larger, regular spores with their even bands not fragmentary, render this species not difficult to distinguish from those of similar general appearance, when they have once been studied.

Habitat: upon dead poplar wood and bark.

We have specimens collected in Wisconsin in 1897, locality not given, and one from Star lake August 4, 1901.

TRICHIA FALLAX PERSOON.

1793. Lycoperdon pusillum Hedwig, Abh., I., p. 35, Tab. iii., Fig. 2.

1795. Arcyria decipiens Pers., Ust. Ann. Bot., XV., p. 35.

1796. Trichia fallax Pers., Obs. Myc., I., p. 59, etc.

1899. Trichia decipiens (Pers.) Macbr., N.-A.S.-M., p. 218.

Saccardo: Sporangia clustered, stipitate, crowded, turbinate, from dull yellow to olive-yellow; stipe plicate, the tube continuous with the sporangial cavity; elaters spindle-shape, simple or branched, 4-5μ in the widest part, tapering equally towards each end, the ends from 4 to 6 times as long as the diameter of the smooth thread; spiral bands 3, smooth, prominent; spores warted, 10-12μ .

Macbride adopts the name Trichia decipiens (Pers.) Macbr. His description differs but little from that given above. He calls the color shining olive or olivaceous brown. He says of the stipe that it is generally elongate, concolorous above, dark brown below, hollow, i. e., filled with spore-like cells. He speaks of the elaters as having long, smooth, unwound tips. The spores under the lens he finds to be pale, minutely delicately reticulate, 10-12μ in diameter.

Lister states that the plasmodium is rose-colored or white, the sporangium-wall membranous and of two layers.

He finds the spores minutely warted or more or less distinctly reticulated on one side and 9-12μ in diameter.

Massee finds some of the sporangia to be subsessile. He describes the spores as covered with a very fine irregular network.

The specimens which I have vary in color from a medium yellow which closely resembles the color of some of the Hemiarcyria clavata, to dark olive brown. The size also varies. These variations are quite marked sometimes in material gathered at the same date and place. Some of the elaters carry their spiral bands nearly or quite to the tip. The spores I find to be finely equally reticulated, and 10-12μ in diameter.

Several groups of sporangia upon a piece of poplar bark, found at Blue Mounds April 29, 1904, are distinctly sessile, the sporangia being attached to the substratum by their attenuated bases. From their general appearance they might easily be mistaken for T. varia, or T. persimilis, but under the microscope the elaters and spores show the characteristics of T. fallax perfectly. These specimens are evidently of last year's growth, and the variation may have come about by its fruiting very late in the fall under unfavorable conditions.

Another set of dried specimens from East Madison, August 5, 1903, vary from light red, semitransparent, to dull

black, opaque; from subsessile to stipitate. Many are wrinkled, roughened, very hard and brittle. A very few of the sporangia are soft and lighter colored at the top. In this softer portion I found the characteristic capillitium and spores of T. fallax. It was impossible to crush the most of these sporangia in such a manner as to learn the character of the contents. These are evidently immature fruiting bodies which have been arrested in their development. Occasionally similar brittle black sporangia are found mingled with ripe perfect sporangia of T. fallax. Such imperfect forms as these may have been named as new species sometimes. Lister mentions specimens of T. botrytis in the Strassburg Herbarium which he says have "sessile, black, and brittle sporangia associated with others of brown and bright nut color." They may have been immature specimens arrested in development.

We have specimens from Blue Mounds, October 4, 1902; many from Cemetery woods in October, 1903; from U. W. Campus woods in October, 1903, and from East Madison August 5, 1903. All of these were growing upon dead poplar wood. The sessile form from Blue Mounds was found April 29, 1904. It is upon poplar bark.

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The following species are in the Herbarium of the University, but their descriptions are not in this volume:

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" spumarioides
Comatricha Persoonii
Craterium leucocephalum
Cribraria dictydioides
Didymium melanospermum
" nigripes
" squamulosum
Physarum auriscalpium
" cinereum
" globuliferum
" leucopus
" melleum
" nucleatum
" variabile

Stemonitis Maxima

" Morgani

Tilmadoche alba

" polycephala

" viridis

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